

scholtzia described by Professor Greene are all reduced to *E. Californica*, for which full reasons are given. The third part is entitled "Miscellaneous Studies," chief among which is the discussion of *Mimulus*. The proposal to divide the genus by restoring *Diplacus* and *Eunanus* to generic rank is not approved, and the observations given, on the whole, confirm Dr. Gray's conclusions, although they somewhat modify his sections.

NOTES AND NEWS.

W. L. GOODWIN, of Queen's University, Kingston, records (*Can. Record Sci.*, Oct.) the survival of a pine tree after girdling.

GARDEN AND FOREST has begun an interesting series of articles upon the elements of vegetable physiology, by Dr. George L. Goodale of Harvard University.

DR. JULIUS VON SACHS, the well-known professor of botany and director of the botanic garden at Würzburg, has declined a call to the University at Munich.

DR. DAVID DIETRICH, author of the extensive "Forst-Flora" and curator of the herbarium of the University of Jena, died on the 23d of October, in the 90th year of his age.

THE LAST ISSUED part of the *Journal* of the Linnean Society continues Forbes' enumeration of the plants of the Chinese region. The list has just reached the Compositæ. Many new species are described.

IN REVIEWING Wigand's *Das Protoplasma als Fermentorganismus*, Dr. Goodale (*Am. Jour.* Jan.) refers to an expression the author once used in conversation, "my whole life has revolved around Tannin, Darwinism and Bacteria."

IN THE *Journal de Botanique* (Dec. 16) Van Tieghem writes of hydroleucites and aleurone grains, and Lagerheim (of Stockholm) describes (with colored plates) a new genus of Chytridiaceæ, parasitic upon the uredospores of certain Uredineæ.

MR. ARTHUR HOLLICK records (*Bull. Torr. Club*, Dec.) the discovery of *Quercus heterophylla*, the famous "Bartram Oak," at Tottenville, Staten Island, N. Y., and in the same connection gives an interesting review of the literature of this oak and also of *Q. Rudkini* Britton.

AN ABNORMAL *Rudbeckia hirta* is reported by O. A. Farwell, of Phoenix, Mich., in which there are nine small heads sessile in the axils of the involucre scales of an ordinary head. They are 3 to 20-flowered, with 2 to 6 rays, and have an involucre of 3 to 8 equal scales in a single row.

DR. BESSEY reports (*Am. Nat.* Dec.) that the notable weeds of the Nebraska plains are as follows, supposably in the order of their unpopularity: *Cenchrus tribuloides*, *Solanum rostratum*, *Helianthus annuus*, *Hordeum jubatum*, and the two tumble-weeds, *Amarantus albus* and *Cyclocoma platyphyllum*.

THE GAZETTE discovers that it owes its readers an apology for the miserable wrapping of the December number. The thing was so unusual that it excited remark, and we do not wonder. Were it possible we would duplicate the abused numbers. It was simply one of those mistakes for which no one seems to be blameworthy, but which will not occur again.

IN A PRELIMINARY communication¹ regarding his experiments in the Tübingen laboratory on the effect of the lower oxygen pressure on the movements of protoplasm, James Clark shows that when the pressure is reduced to 1.2-3.0 mm. of mercury all movement quickly stops.

C. WARNSTORF, of Neuruppin, Germany, asks the directors of herbaria and all bryologists to aid him with material for study of the Sphagnaceæ of foreign countries. He promises to use submitted material with the utmost care, and, unless otherwise specified by the sender, to return it after examination. He has in contemplation a *Sphagnologia Universa*. As Warnstorf is already known as one of the most thorough students of this perplexing group, we hope he will meet with a generous response to his request.

STAHL (*Bot. Zeit.* 1880) states that in *Lemna trisulca* the chlorophyll grains, which in ordinary diffused light are ranged upon the two walls of each cell lying parallel to the frond's surface, at night are driven to the side walls or lowest wall, leaving the superficial one bare. Mr. Spencer Le M. Moore (*Jour. Bot.* Dec.), in his observations on the subject, differs somewhat from these conclusions. His results show that while many of the grains are driven by darkness from the superficial to the side walls, many of them still remain on the superficial wall. This subject of photolysis is a very interesting one, and observers having duck-weed convenient would find in it a profitable field of investigation.

IN THE SEVENTH part of the Proceedings of the German Botanical Society (p. 248), Frank sums up his preceding observations and researches on mycorrhiza, which go to show that the fungus of mycorrhiza acts as a transporter of nourishment for the plants. Mycorrhiza is most widely distributed. Specimens of tree roots from the most diverse parts of the world exhibit it, and the number of sorts of trees on which it has been found is now very large. (In the proceedings of the same meeting is published a paper by Alb. Schlicht, listing forty seven more species of herbaceous plants on which it occurs.) Mycorrhiza is dependent for its development on the presence of humus in the soil, and therefore the fungus can not be a true parasite. The further facts that the roots at no time of year are free from the fungus, that roots thus invested do not perish sooner than others, and that cultivation experiments with beech seedlings show them poorly nourished without mycorrhiza even in humus itself, all go to establish the symbiotic character of the association.

DR. ADAM PRAZMOWSKI discusses in an address delivered before the biological section of the Congress of Polish naturalists,² the nature and function of the root tubercles of the Leguminosæ. He has been unable to confirm Ward's observations as to the nature of the "bacteroid" bodies and the fungus itself. He considers that the tubercles are due to the attack of a special organism which may be said to belong to the fungi in the widest sense, but is not a hyphal fungus (*Hyphenpilz*), although in its young stage it occurs in the form of hypha-like filaments, which collectively form a sort of mycelium. It does not possess the characteristic membrane of the fungi, and in its older stages forms a sort of plasmodium. In many ways it approaches such Myxomycetes as *Plasmodiophora Brassicæ*. As to the bacteroid bodies themselves, Prazmowski thinks that they can not be germs, because he has observed the formation of spores in the older and injured tubercles only, and because these

¹ *Berichte d. deutsch. bot. Gesells.*, vi, 273.

² See the *Botanisches Centralblatt* xxxvi, 215, 248, 280.

bacteroids remain unchanged even after disorganization and putrefaction of the tubercles has occurred. The relation between the fungus and the host he considers one of symbiosis.

VOIGT HAS RECENTLY published his researches on the growth and development of seeds with ruminated endosperm belonging to the Palms, Myristicaceæ and Anonaceæ of Java. Among the Palms he distinguishes two cases: (a) with the prolongations of the seed-coats cylindrical, without connection with the fibro-vascular bundle of the testa, beginning at or before fertilization; (b) with the prolongations plate-like, or when less developed, swellings or ridges of greater or less breadth, inserted over the fibro-vascular bundle of the testa and receiving twigs from it. In *Myristica fragrans* the ovule has two integuments, but the inner covers only the upper part of the ovule. Soon after the opening of the flowers most of the tissues of these integuments and the nucellus passes over into permanent tissue, only the lower part of the outer integument and the lower part of the nucellus remaining meristematic. In the base of the nucellus, which grows very rapidly after fertilization, an outer layer (next the outer integument) and an inner layer (next the embryo sac) become permanent tissue, the former finally forming part of the testa. In this first mentioned layer a much branched vascular system develops connected with the vascular bundle of the rhaphe. Over the twigs of this vascular system arise projections which push themselves inwards deeply into the endosperm. In Anonaceæ the plates producing the "ruminations" arise in four vertical rows by local growth of the outer integument. Each plate is thin and quadrant-shaped, with the central angle rounded. One of each row stands at the same height. A fuller abstract will be found in the *Botanisches Centralblatt*, xxxvi, 1344.

DR. J. H. WAKKER has an important paper in the final part of the nineteenth volume of Pringsheim's *Jahrbücher*, entitled, "Studien über die Inhaltkörper der Pflanzenzelle." The following translation of his summary of results will give an idea of the scope of the paper:

"Calcium oxalate crystals which are found inside the plant cell are formed exclusively in the vacuoles. The dragging of the crystals around by the movements of the plasma does not conflict with this fact [because in this case the vacuole divides and a small vacuole surrounds each crystal]. Aleurone grains are vacuoles filled with proteids. By the drying of ripening seeds the proteids become solidified, and by the softening which precedes germination the reverse takes place. In the formation of seeds the originally single vacuole divides into many, and in germination the reverse occurs, so that the emptied cells of the germinated seed again contain a single central vacuole. The proteids dissolved in the cell sap of ripening and germinating seeds can be precipitated by several reagents, viz.: dilute nitric acid, absolute alcohol, salt solutions, etc. By using these substances one can follow, step by step, the slow disappearance of the proteids in seeds kept in the dark. Globoids are formed in the vacuoles. Crystalloids can be formed in different places, viz.: in the vacuoles, the plasma, the nuclei or the plastids. Fixed oil is always formed in the plasma; either in specialized bodies (elaioplasts), or distributed through the plasma as in seeds. Plasma, during plasmolysis, can be perforated without causing its death."

It will be observed that this paper, together with that of Went, on the origin of vacuoles, in the preceding part of the same publication (see this journal, xiii, 280), extend our knowledge of the vacuole enormously, and show that it is much more than a space in the protoplasm formed by its inability to keep up with the growth of the cell wall,